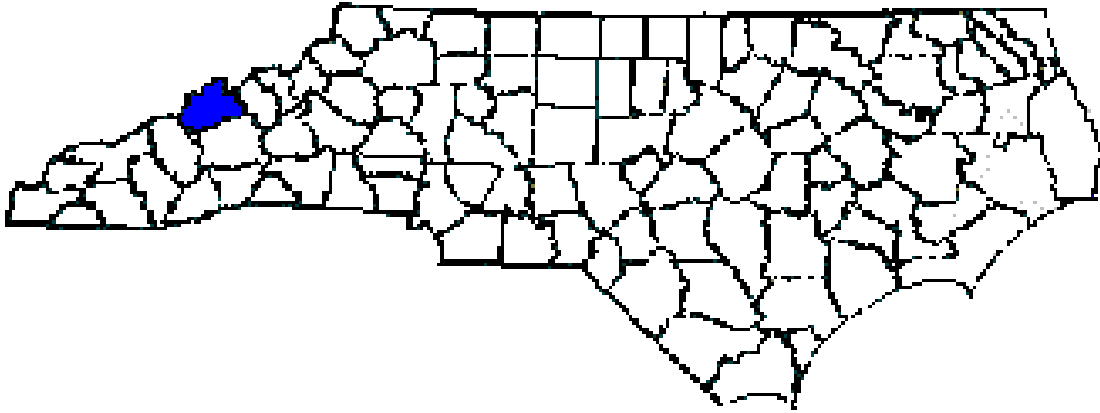


ANNUAL REPORT FOR 2010



Middle Fork Creek Site E Mitigation Site
Madison County
TIP No. R-2518A



Prepared By:
Natural Environment Unit & Roadside Environmental Unit
North Carolina Department of Transportation
December 2010

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SUMMARY

The following report summarizes the stream monitoring activities that have occurred during the Year 2010 at the Middle Fork Creek Site E Mitigation Site in Madison County. The North Carolina Department of Transportation (NCDOT) completed this project in November 2008 and water was turned in May 2009. This report provides the monitoring results for the first formal year of monitoring (Year 2010). The Year 2010 monitoring period was the first of five scheduled years of monitoring on the Middle Fork Creek Site E Mitigation Site (See Success Criteria Section 2.1).

Based on the overall conclusions of monitoring at the Middle Fork Creek Site E, it has met the required monitoring protocols for the first formal year of monitoring. The channel throughout the stream restoration site is stable at this time. The streambank and buffer area have not been planted for the first year of monitoring. NCDOT will monitor the planted vegetation once it is established. NCDOT will take photos of the stream preservation once the roadway construction is completed.

NCDOT will continue stream monitoring at the Middle Fork Creek Site E Mitigation Site for 2011.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during the Year 2010 at the Middle Fork Creek Site E Mitigation Site. Site E is located on US 19 in Madison County at Sta. 33+80 Rt. and Sta. 33+80 to 38+00 Lt. -L- (Figures 1-4). The Middle Fork Creek Site E was constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number R-2518A in Madison County.

The mitigation site provided approximately 833 linear feet of stream restoration and 820 linear feet of stream preservation. Construction was completed during November 2008 and water was turned in May 2009 by the NCDOT. Stream restoration involved backfilling a portion of the existing channel so the roadway could be extended. A new floodplain and channel were excavated and several in-stream structures such as cross vanes and j-hooks were installed. The riparian buffer will also be planted.

1.2 Purpose

In order for a mitigation site to be considered successful, the site must meet the success criteria. This report details the monitoring in 2010 at the Middle Fork Creek Site E Mitigation Site. Hydrologic monitoring was not required for this site.

1.3 Project History

November 2008	Construction Completed
May 2009	Water Turned Into Stream
October 2009	As-Built Survey Completed
November 2010	Stream Channel Monitoring (Year 1)

1.4 Debit Ledger

The entire Middle Fork Creek Site E stream mitigation site was used for the R-2518A project to compensate for unavoidable stream impacts.

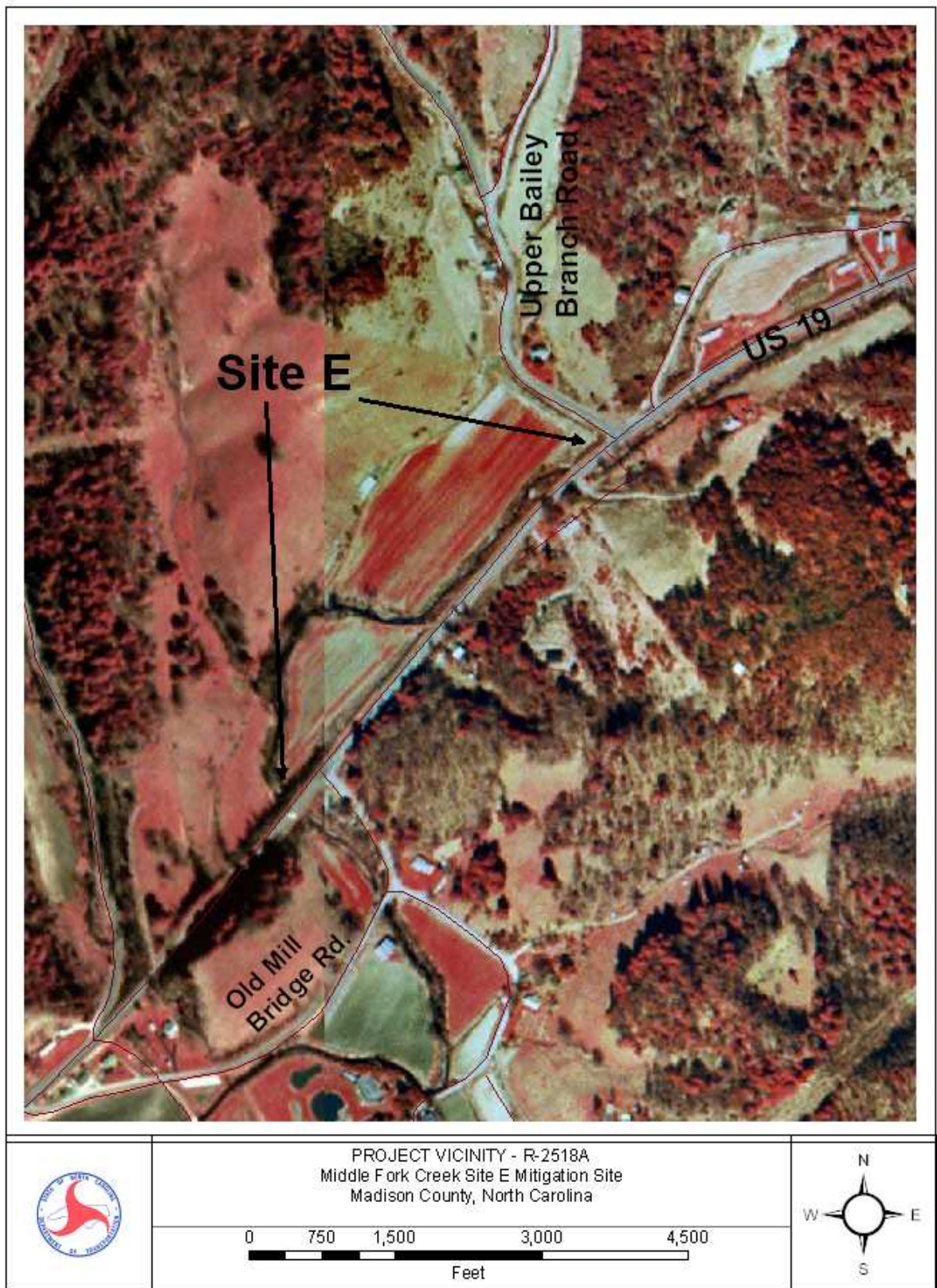


Figure 1. Vicinity Map

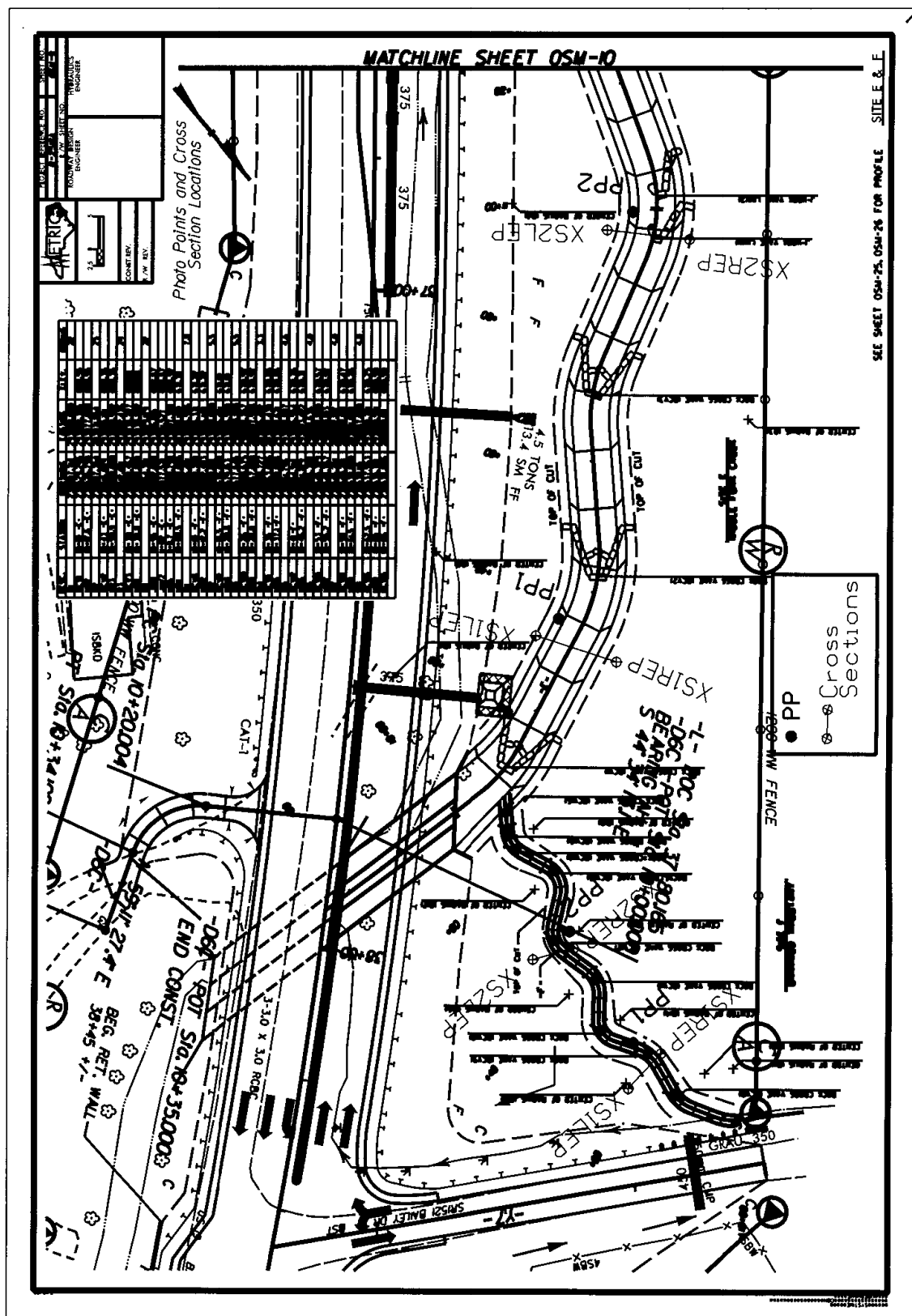
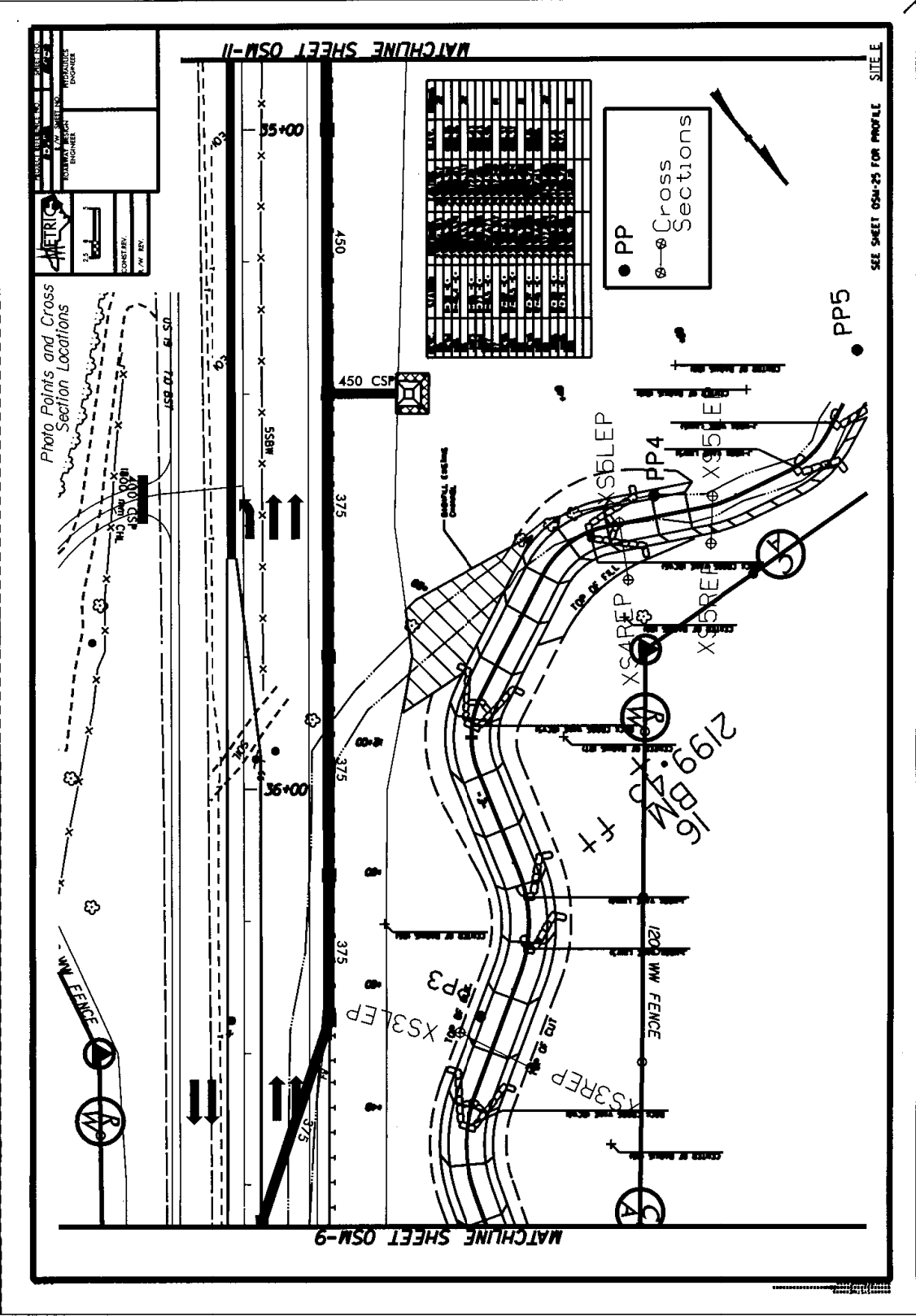


Figure 2. Site E Map



r2518a_pdea_psh10_as-built.dgn 12/21/2010 9:36:38 AM

Figure 3. Site E Map

2.0 STREAM ASSESSMENT

2.1 Success Criteria

The permittee shall monitor the restoration and enhancement mitigation sites following the Level 1 protocols outlined in the "Stream Mitigation Guidelines," dated April 2003 with the following exceptions:

1. Pebble counts shall not be conducted.
2. Two cross sections shall be conducted for streams less than 500 linear feet and five (5) cross sections shall be conducted for streams greater than 500 linear feet.
3. Riparian success shall be by visual inspection of plant survival. Photos will be taken and comments noted on plant survival.

The permittee shall monitor the preservation sites by visual inspection. Photos will be taken and comments noted on plant survival. The monitoring shall be conducted annually for a minimum of five (5) years after final planting. The monitoring results shall be submitted to DWQ in a final report within sixty (60) days after completing monitoring. After 5 years the NCDOT shall contact the DWQ to schedule a site visit to "close out" the mitigation site.

2.2 Stream Description

2.2.1 Post-Construction Conditions

The restoration of the Middle Fork Creek Site E Mitigation Site involved backfilling a portion of the existing channel so the roadway could be extended. A new floodplain and channel were excavated and several in-stream structures such as cross vanes and j-hooks were installed. The riparian buffer will also be planted.

2.2.2 Monitoring Conditions

The objective of the Middle Fork Creek Site E stream restoration was to restore a B4c stream as identified in Rosgen's Applied River Morphology. A total of five cross sections (three in a riffle and two in a pool) were surveyed. For this report, only cross sections containing riffles were used in the comparison of channel morphology presented below in Table 1 (Site E).

Table 1. Abbreviated Morphological Summary (Middle Fork Creek Site E)

Variable	Proposed	Cross-Section #1 (Riffle)	Cross-Section #3 (Riffle)	Cross-Section #5 (Riffle)	Min – Max Values (Riffle Sections only)
		2010	2010	2010	2010
Drainage Area (mi ²)	10.4	10.4	10.4	10.4	10.4
Bankfull Cross Sectional Area (ft ²)	61.9	59.32	62.4	38.49	38.49 - 62.4
Maximum Bankfull Depth (ft)	2.7-3.4	3.26	3.59	2.13	2.13 – 3.59
Width of the Floodprone Area (ft)	46	45	40	34.6	34.6 - 45
Bankfull Mean Depth (ft)	2.27	2.16	2.22	1.66	1.66 – 2.22
Width/Depth Ratio	12	12.74	12.64	14	12.64 - 14
Entrenchment Ratio	1.7	1.64	1.43	1.49	1.43 – 1.64
Bankfull Width (ft)	27.3	27.51	28.06	23.24	23.24 – 28.06

* Riffle values are used for classification purposes, pool values are shown in Appendix A.

2.3 Results of the Stream Assessment

2.3.1 Site Data

The assessment included the survey of five cross sections and the longitudinal profile of the Middle Fork Creek Site E established by NCDOT after construction. The length of the profile along the Middle Fork Creek Site E was approximately 900 linear feet. Five cross sections were established during the as-built monitoring year. Cross section locations were subsequently based on the stationing of the longitudinal profile and are presented below. The location of the cross sections and longitudinal profile are shown in Appendix A.

Middle Fork Creek Site E Cross-Sections:

- ◆ Cross-Section #1: Middle Fork Creek Site E, Station 102+00, midpoint of riffle
- ◆ Cross-Section #2: Middle Fork Creek Site E, Station 316+00, midpoint of pool
- ◆ Cross-Section #3: Middle Fork Creek Site E, Station 500+00, midpoint of riffle
- ◆ Cross-Section #4: Middle Fork Creek Site E, Station 805+00, midpoint of pool
- ◆ Cross-Section #5: Middle Fork Creek Site E, Station 853+00, midpoint of riffle

Based on comparisons of the As-Built to Year 1 monitoring data, all of the cross sections appear stable with little or no active bank erosion. Graphs of the cross sections are presented in Appendix A. Future survey data will vary depending on actual location of rod placement and alignment; however, this information should remain similar in appearance. The longitudinal profile showed that the channel was stable for the 2010 monitoring evaluation. Pebble counts were not required per the permit conditions and therefore were not completed.

3.0 VEGETATION: MIDDLE FORK CREEK SITE E

3.1 Description of Species

The following tree species are scheduled to be planted on the stream bank:

Salix nigra, Black Willow

Cornus amomum, Silky Dogwood

The following tree species are scheduled to be planted in the buffer area:

Liriodendron tulipifera, Yellow Poplar

Platanus occidentalis, Sycamore

Fraxinus pennsylvanica, Green Ash

Quercus alba, White Oak

3.2 Results of Vegetation Monitoring

Streambank & Buffer Vegetation: Reforestation has not been completed as of the Year 1 monitoring evaluation.

3.3 Conclusions

NCDOT will monitor the planted vegetation once it is established.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The Middle Fork Creek Site E Mitigation Site has met the required monitoring protocols for the first formal year of monitoring. The channel throughout the stream restoration site is stable at this time. NCDOT will monitor the planted vegetation once it is established. NCDOT will take photos of the stream preservation once the roadway construction is completed.

NCDOT will continue monitoring the Middle Fork Creek Site E Mitigation Site in 2011.

5.0 REFERENCES

Stream Mitigation Plan, US Highway 19, R-2518A On-Site Mitigation
Madison County, North Carolina, August 2006.

Design Plans for R-2518A, US 19 from I-26 to 0.8 KM east of the Yancey Co.
Line, Stream Mitigation (Preservation, Enhancement, and Restoration),
HSMM.

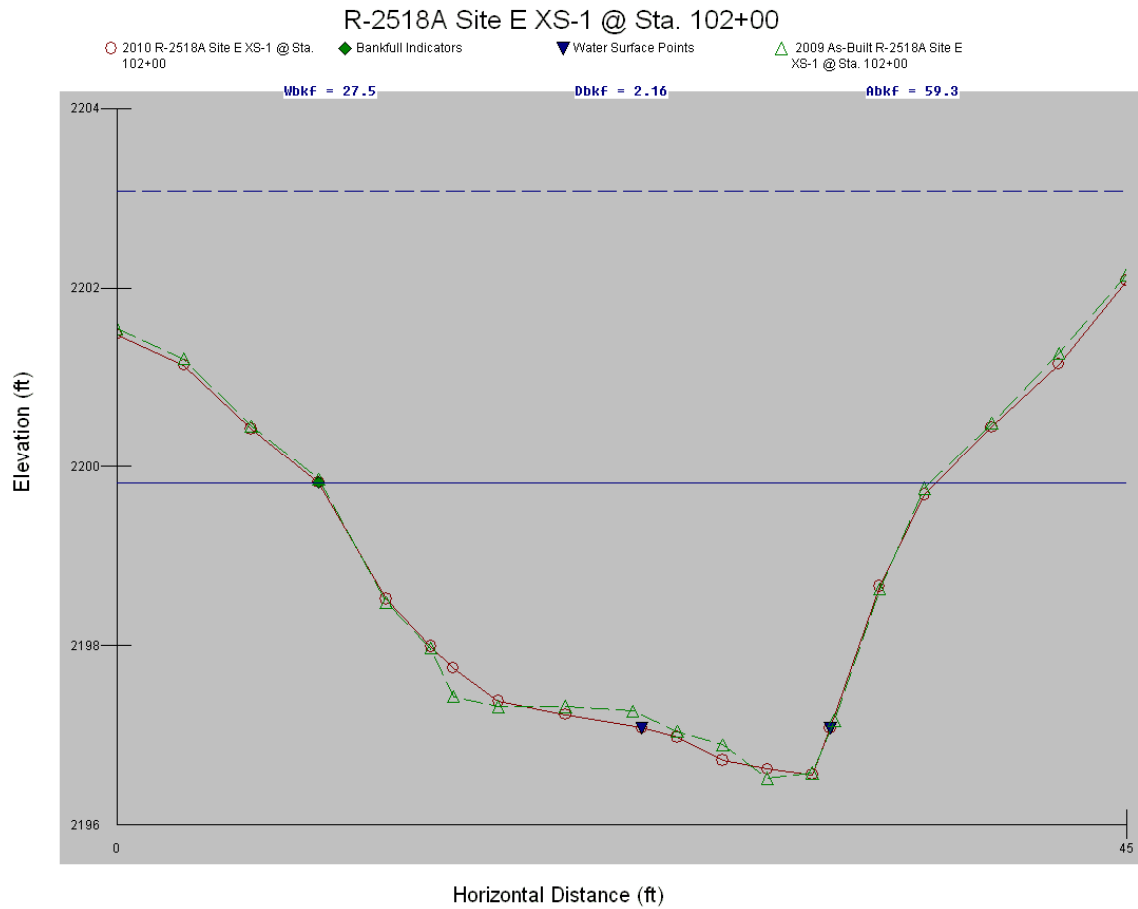
North Carolina Department of Transportation (NCDOT), April 29, 2008. 404 and
401 Individual Permits for R-2518A and R-2518B (ACOE Permit No. 2007-
2197-357/300 and DWQ Project No. 20071134, Individual Certification No.
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Rosgen, D.L, 1996. Applied River Morphology. Wildland Hydrology, Pagosa
Springs, Colorado.

US Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines.
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NC Wildlife Resources Commission, and the NC Division of Water Quality.

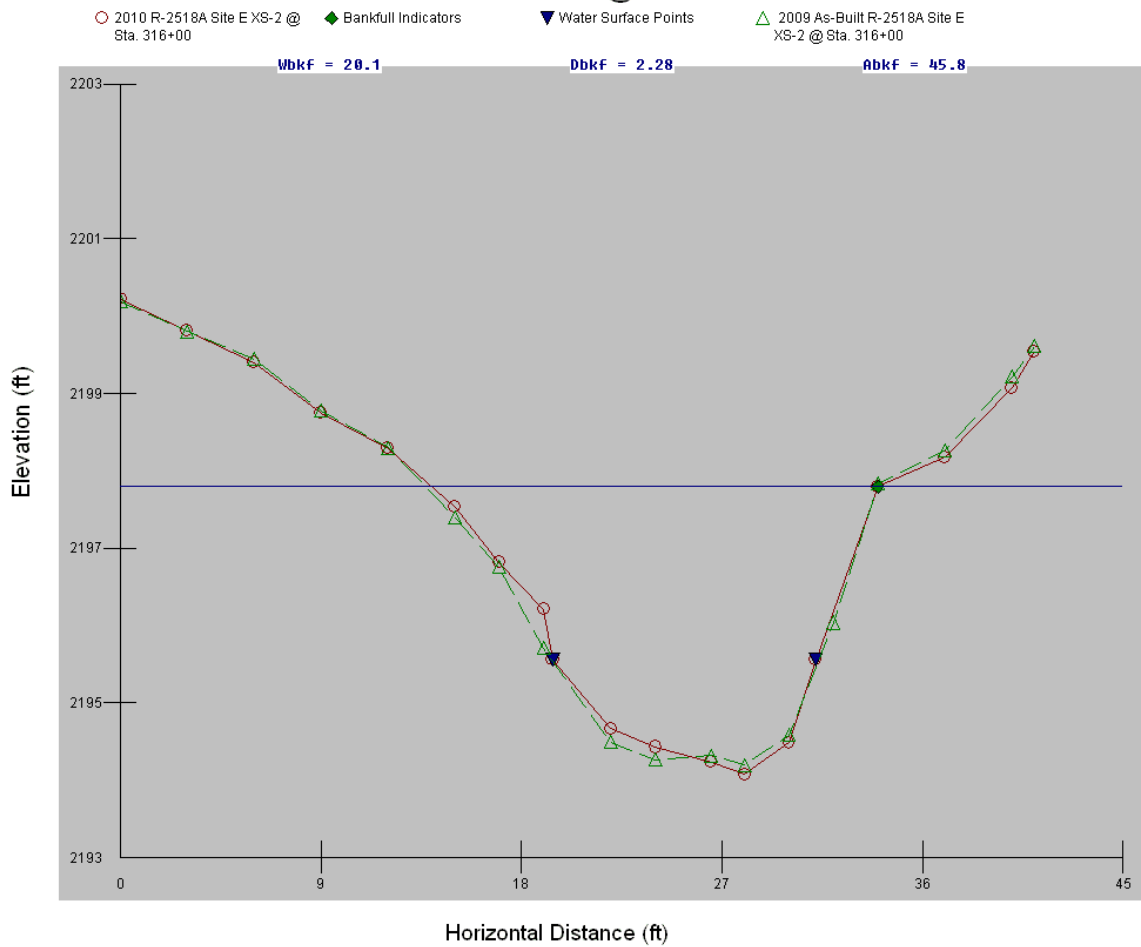
APPENDIX A

CROSS SECTIONS AND LONGITUDINAL PROFILE



Site E: Cross-Section #1 (Riffle) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft ²)	59.32				
Maximum Bankfull Depth (ft)	3.26				
Width of the Floodprone Area (ft)	45				
Bankfull Mean Depth (ft)	2.16				
Width/Depth Ratio	12.74				
Entrenchment Ratio	1.64				
Bankfull Width (ft)	27.51				

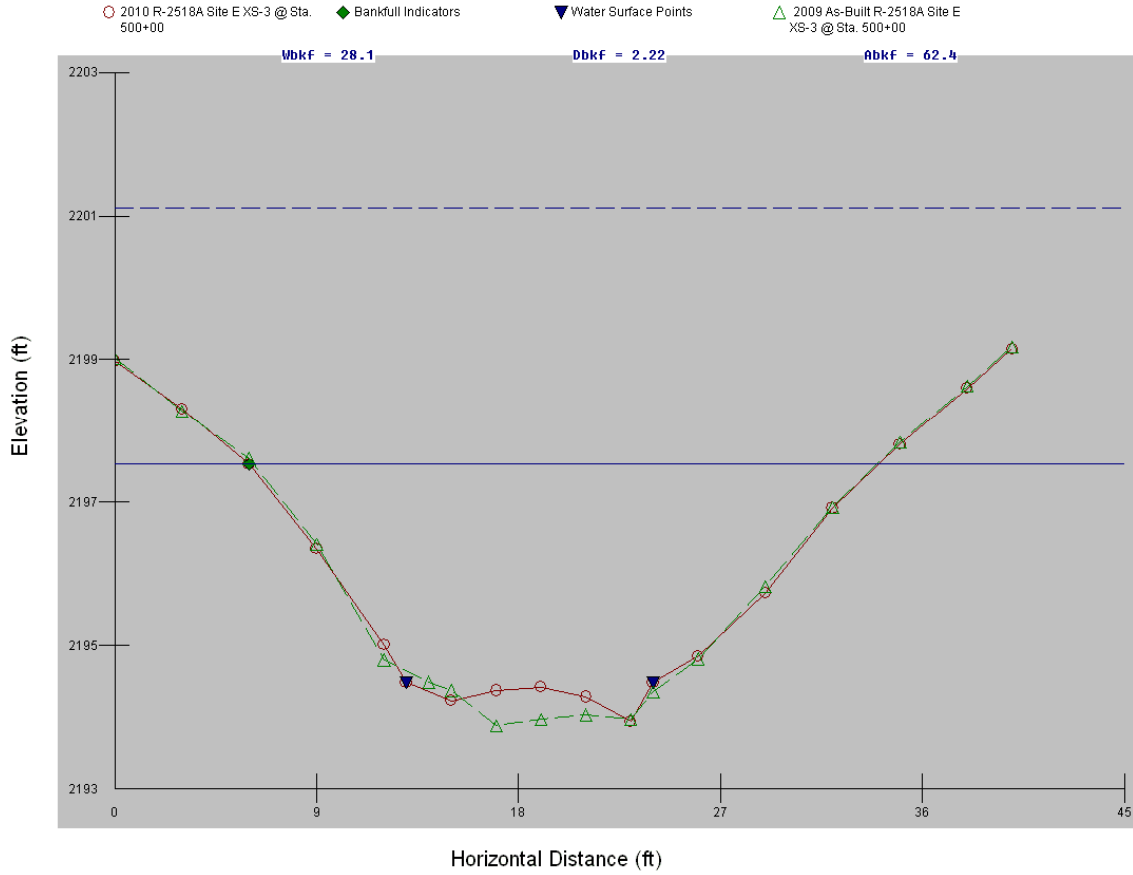
R-2518A Site E XS-2 @ Sta. 316+00



Site E: Cross-Section #2 (Pool) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft ²)	45.83				
Maximum Bankfull Depth (ft)	3.72				
Bankfull Mean Depth (ft)	2.28				
Bankfull Width (ft)	20.07				

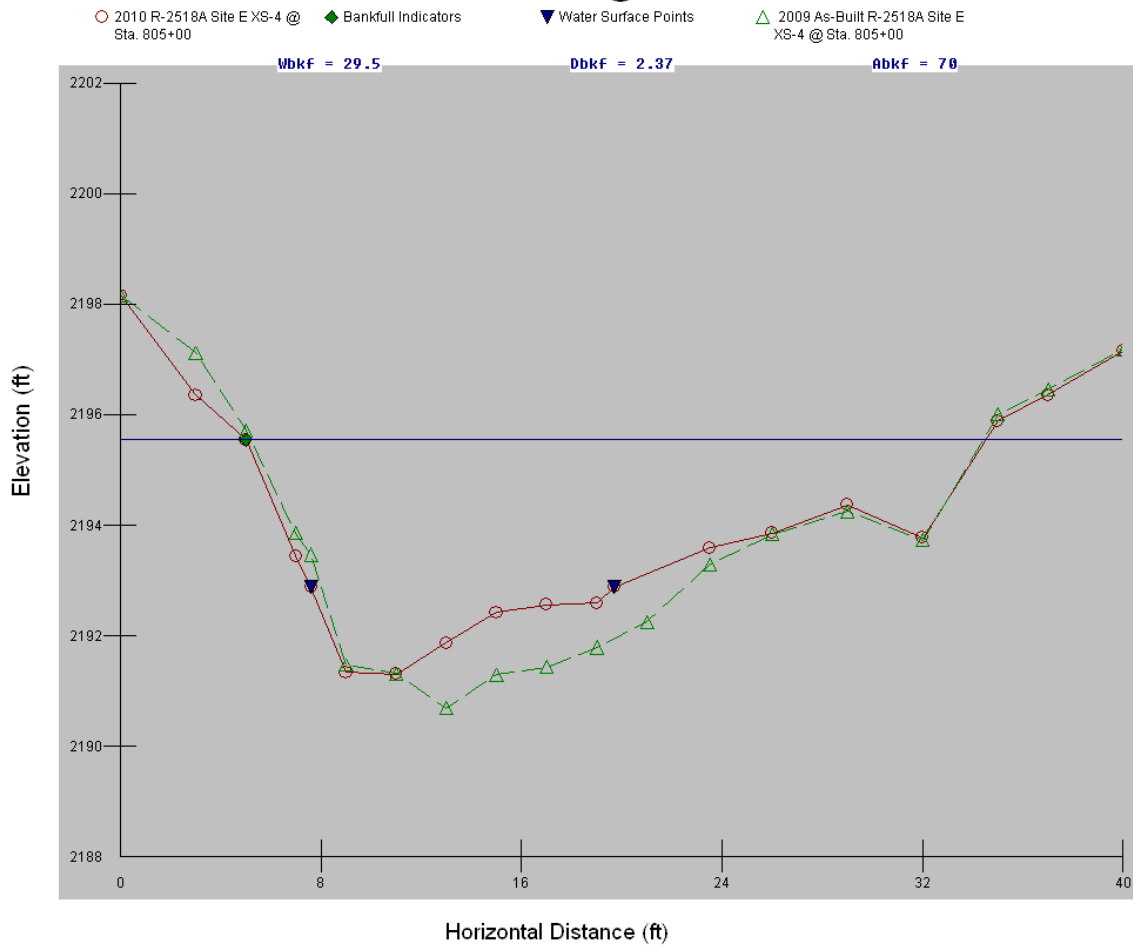
*According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.

R-2518A Site E XS-3 @ Sta. 500+00



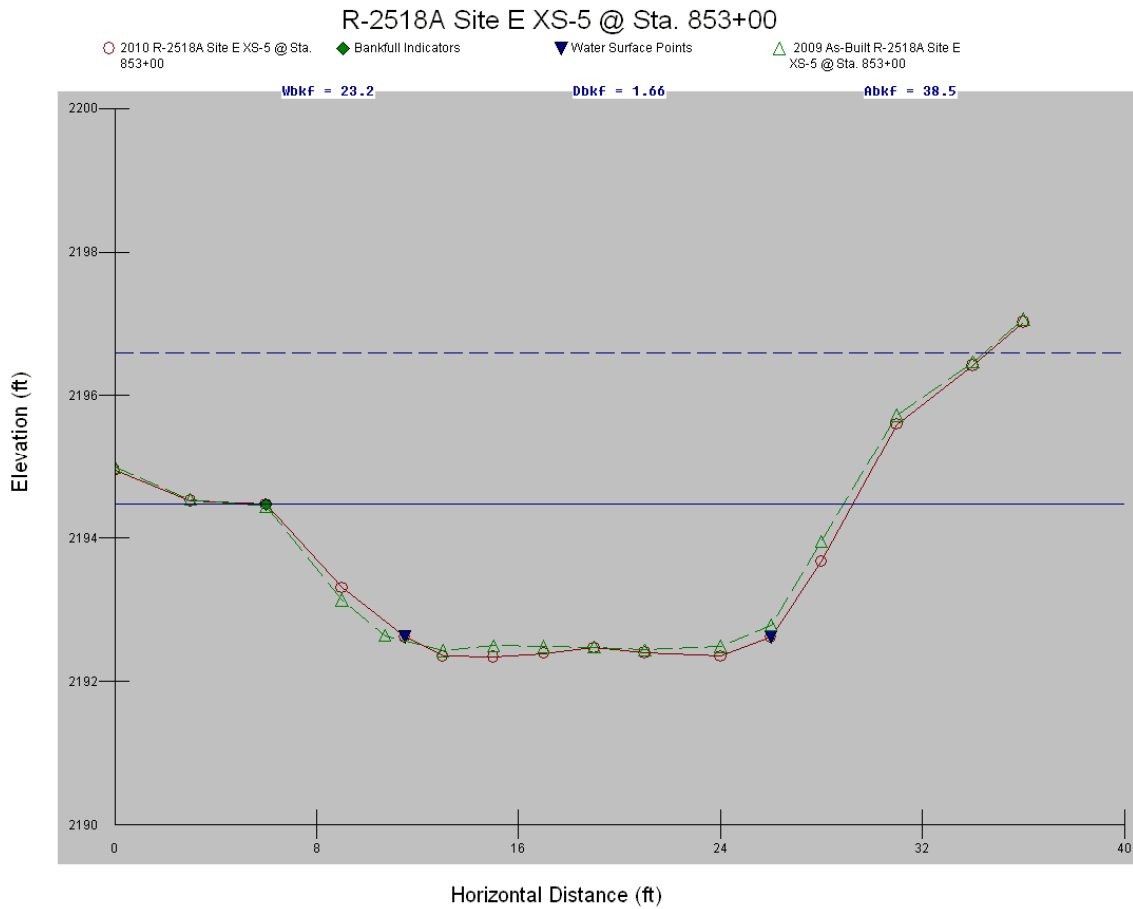
Site E: Cross-Section #3 (Riffle) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft ²)	62.4				
Maximum Bankfull Depth (ft)	3.59				
Width of the Floodprone Area (ft)	40				
Bankfull Mean Depth (ft)	2.22				
Width/Depth Ratio	12.64				
Entrenchment Ratio	1.43				
Bankfull Width (ft)	28.06				

R-2518A Site E XS-4 @ Sta. 805+00



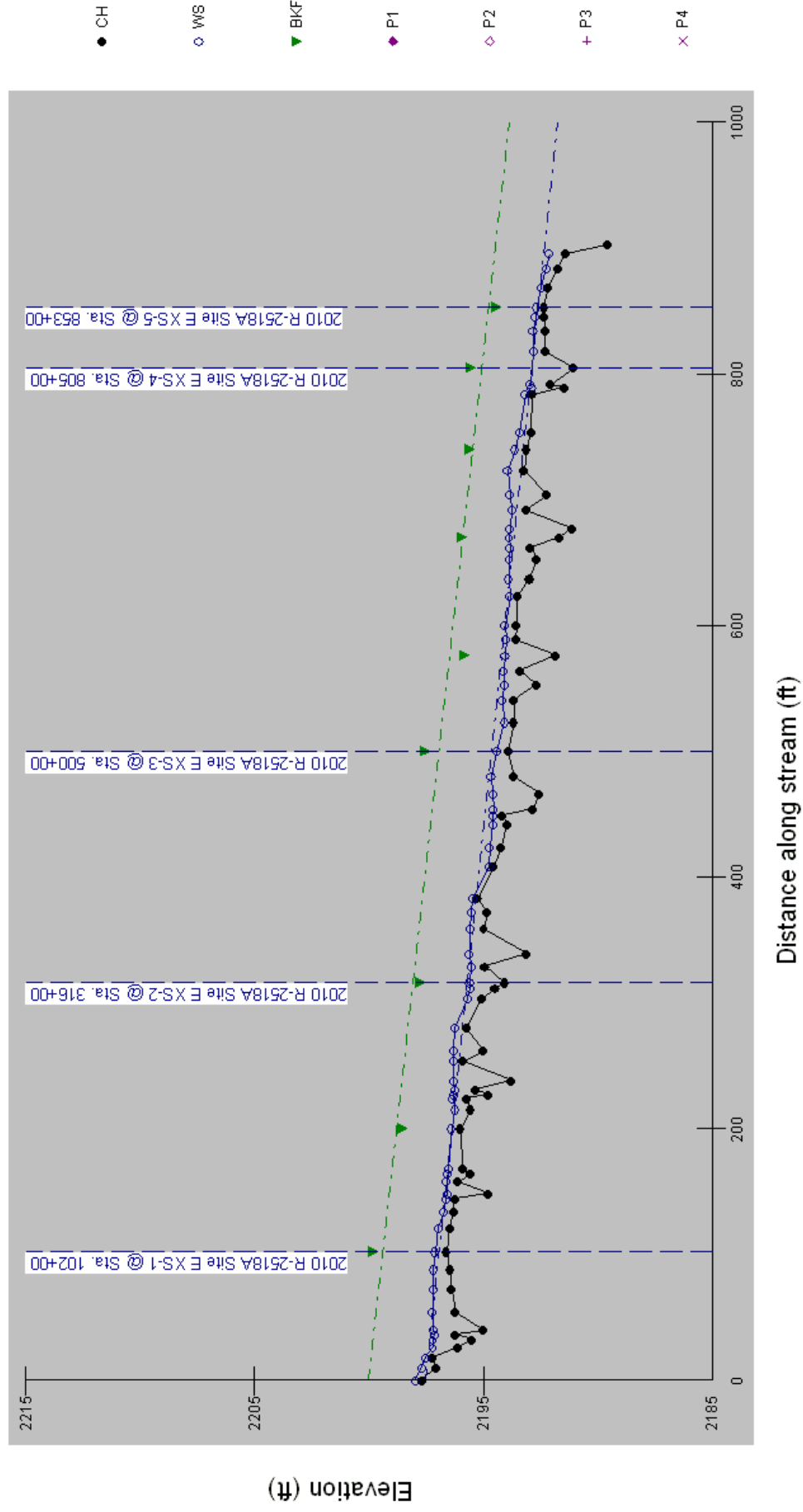
Site E: Cross-Section #4 (Pool) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft ²)	69.95				
Maximum Bankfull Depth (ft)	4.24				
Bankfull Mean Depth (ft)	2.37				
Bankfull Width (ft)	29.53				

*According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.



Site E: Cross-Section #5 (Riffle) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft ²)	38.49				
Maximum Bankfull Depth (ft)	2.13				
Width of the Floodprone Area (ft)	34.6				
Bankfull Mean Depth (ft)	1.66				
Width/Depth Ratio	14				
Entrenchment Ratio	1.49				
Bankfull Width (ft)	23.24				

2010 R-2518A Site E Profile



APPENDIX B

SITE PHOTOGRAPHS

Middle Fork Creek Site E



Photo Point #1 (Upstream)



Photo Point #1 (Downstream)



Photo Point #2 (Upstream)



Photo Point #2 (Downstream)



Photo Point #3 (Upstream)



Photo Point #3 (Downstream)

November 2010

Middle Fork Creek Site E



Photo Point #4 (Upstream)



Photo Point #4 (Downstream)



Photo Point #5 (Upstream)

November 2010



Photo Point #5 (Downstream)